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# Product Datasheet

## DAC-QSFP-40G-2M-AT

### Universally Coded MSA 40Gb/s QSFP+ Direct Attach Cable Copper, Passive, 2m

#### FEATURES

- Compliant with SFF- 8436, SFF-8431, SFF-8432 and SFF-8472
- Up to 40Gb/s data rate per channel
- Up to 7m transmission available
- Operating temperature: 10℃ ~ 70℃
- Single 3.3V power supply
- RoHS compliant
- Cost-effective copper solution
- Lowest total system power solution
- Lowest total system EMI solution
- Optimized design for Signal Integrity

#### APPLICATIONS

Data

- Servers
- Networked storage systems
- Routers
- External storage systems
- Data Center networking

Communications

- Switches
- Routers

#### INDUSTRIAL STANDARDS

- InfiniBand Trade Association (IBTA)
- IEEE802.3ba
- 40Gigabit Ethernet (40G BASE – CR4)

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## DESCRIPTION

ATGBICS® Universally Coded MSA DAC-QSFP-40G-2M-AT QSFP+ (Quad Small Form-factor Pluggable Plus) copper direct-attach cables are suitable for very short distances and offer a highly cost-effective way to establish a 40-Gigabit link between QSFP+ ports of QSFP+ switches within racks and across adjacent racks. These cables are used for 40GbE and Infiniband standards, to maximize performance. QSFP+ are designed to meet emerging data center and high-performance computing application needs for a high-density cabling interconnect system capable of delivering an aggregate data bandwidth of 40Gb/s.

This interconnect system is fully compliant with existing industry standard specifications such as the QSFP MSA and IBTA (InfiniBand Trade Association). The QSFP+ cables support the bandwidth transmission requirements as defined by IEEE 802.3ba (40 Gb/s) and Infiniband QDR (4x10 Gb/s per channel) specifications.

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## QSFP+ Pin Function Definition

| Pin | Logic | Symbol | Description |
|---|---|---|---|
| 1 | | GND | Ground |
| 2 | CML-I | Tx2n | Transmitter Inverted Data Input |
| 3 | CML-I | Tx2p | Transmitter Non-Inverted Data Input |
| 4 | | GND | Ground |
| 5 | CML-I | Tx4n | Transmitter Inverted Data Input |
| 6 | CML-I | Tx4p | Transmitter Non-Inverted Data Input |
| 7 | | GND | Ground |
| 8 | LVTTL-I | ModSelL | Module Select |
| 9 | LVTTL-I | ResetL | Module Reset |
| 10 | | Vcc Rx | +3.3V Power Supply Receiver |
| 11 | LVCMOS-I/O | SCL | 2-wire serial interface clock |
| 12 | LVCMOS-I/O | SDA | 2-wire serial interface data |
| 13 | | GND | Ground |
| 14 | CML-O | Rx3p | Receiver Non-Inverted Data Output |
| 15 | CML-O | Rx3n | Receiver Inverted Data Output |
| 16 | | GND | Ground |
| 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output |
| 18 | CML-O | Rx1n | Receiver Inverted Data Output |
| 19 | | GND | Ground |
| 20 | | GND | Ground |
| 21 | CML-O | Rx2n | Receiver Inverted Data Output |
| 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output |
| 23 | | GND | Ground |
| 24 | CML-O | Rx4n | Receiver Inverted Data Output |
| 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output |
| 26 | | GND | Ground |
| 27 | LVTTL-O | ModPrsL | Module Present |
| 28 | LVTTL-O | IntL | Interrupt |
| 29 | | Vcc Tx | +3.3V Power supply transmitter |
| 30 | | Vcc1 | +3.3V Power supply |
| 31 | LVTTL-I | LPMode | Low Power Mode |
| 32 | | GND | Ground |
| 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input |
| 34 | CML-I | Tx3n | Transmitter Inverted Data Input |
| 35 | | GND | Ground |
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Input |
| 38 | | GND | Ground |

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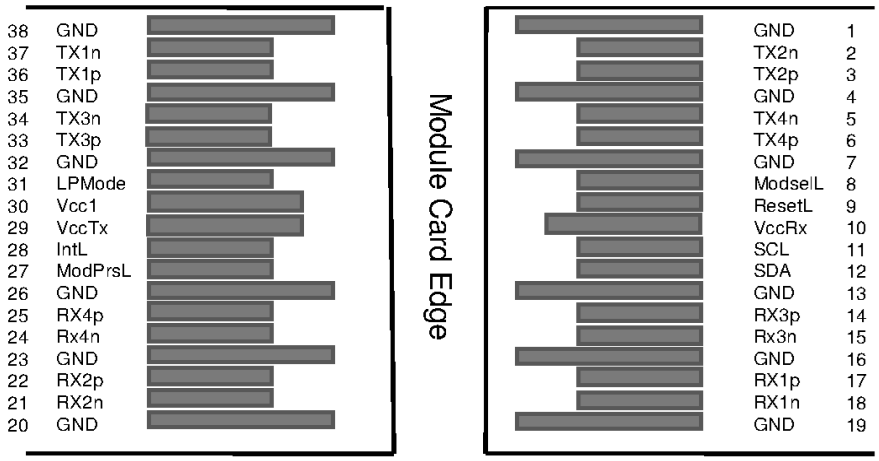


Top Side
Viewed From Top

Bottom Side
Viewed From Bottom

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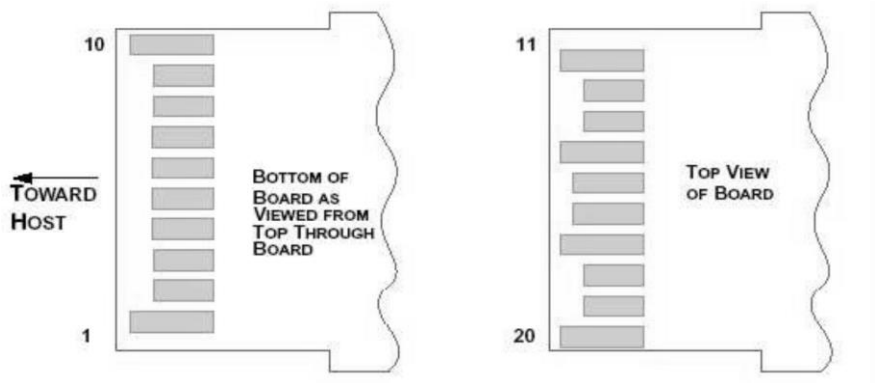
## SFP+ Pin Function Definition

| Pin | Logic | Symbol | Description |
|---|---|---|---|
| 1 | | VeeT | Module Transmitter Ground |
| 2 | LVTTL-O | Tx_Fault | Module Transmitter Fault |
| 3 | LVTTL-I | Tx_Disable | Transmitter disable; Turns off transmitter laser output |
| 4 | LVTTL-I/O | SDA | 2-wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i) |
| 5 | LVTTL-I/O | SCL | 2-wire Serial Interface Clock (Same as MOD-DEF1 in INF-8074i) |
| 6 | | Mod_ABS | Module Absent, connected to VeeT or VeeR in the module |
| 7 | LVTTL-I | RS0 | Rate Select 0, optionally controls SFP+ module receiver |
| 8 | LVTTL-O | Rx_LOS | Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as Signal Detect) |
| 9 | LVTTL-I | RS1 | Rate Select 1, optionally controls SFP+ module transmitter |
| 10 | | VeeR | Module Receiver Ground |
| 11 | | VeeR | Module Receiver Ground |
| 12 | CML-O | RD- | Receiver Inverted Data Output |
| 13 | CML-O | RD+ | Receiver Non-Inverted Data Output |
| 14 | | VeeR | Module Receiver Ground |
| 15 | | VccR | Module Receiver 3.3 V Supply |
| 16 | | VccT | Module Transmitter 3.3 V Supply |
| 17 | | VeeT | Module Transmitter Ground |
| 18 | CML-I | TD+ | Transmitter Non-Inverted Data Input |
| 19 | CML-I | TD- | Transmitter Inverted Data Input |
| 20 | | VeeT | Module Transmitter Ground |



# Product Datasheet

## General Product Characteristics

| Q/4SFP+ DAC Specifications | |
|---|---|
| **Number of Lanes** | Tx & Rx |
| **Channel Data Rate** | 40Gbps |
| **Operating Temperature** | 0 to + 70°C |
| **Storage Temperature** | -40 to + 85°C |
| **Supply Voltage** | 3.3 V nominal |
| **Electrical Interface** | 38 pins edge connector (QSFP+)<br>20 pins edge connector (SFP+) |
| **Management Interface** | Serial, I2C |

## High Speed Characteristics

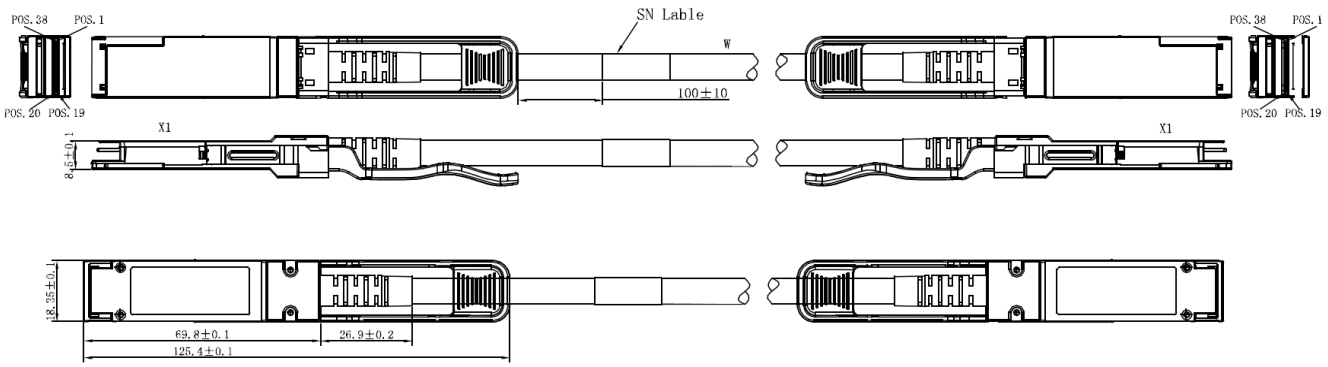
| Parameter | Symbol | Min | Typical | Max | Unit | Note |
|---|---|---|---|---|---|---|
| **Differential Impedance** | TDR | 90 | 100 | 110 | Ω | |
| **Insertion loss** | SDD21 | -17.04 | | | dB | At 5.15625 GHz |
| **Differential Return Loss** | SDD11 | | | See 1 | dB | At 0.05 to 4.1 GHz |
| | SDD22 | | | See 2 | dB | At 4.1 to 11.1 GHz |
| **Differential to common mode return loss** | SCD11<br>SCD22 | | | -10 | dB | At 0.2 to 11.1 GHz |
| **Common-mode to common-mode output return loss** | SCC11<br>SCC22 | | -3 | | dB | At 0.01 to 11.1 GHz |

**Notes:**

1. Reflection Coefficient given by equation SDD11(dB) < -12 + 2 × SQRT (f), with f in GHz
2. Reflection Coefficient given by equation SDD11(dB) < -6.3 + 13 × log10(f/5.5), with f in GHz

## Mechanical Information

The connector is compatible with the SFF-8436 to SFF-8432 specification



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## Regulatory Compliance

| Feature | Test Method | Performance |
|---|---|---|
| **Electrostatic Discharge (ESD) to the Electrical Pins** | MIL-STD-883C Method 3015.7 | Class 1(>2000 Volts) |
| **Electromagnetic Interference (EMI)** | FCC Class B | Compliant with Standards |
| | CENELEC EN55022 Class B | |
| | CISPR22 ITE Class B | |
| **RF Immunity (RFI)** | IEC61000-4-3 | Typically Show no Measurable Effect from a 10V/m Field Swept from 80 to 1000MHz |
| **RoHS Compliance** | RoHS Directive 2011/65/EU and it's Amendment Directives （EU） 2015/863 | RoHS （EU）2015/863 compliant |
| **REACH Compliance** | REACH Regulation (EC) No 1907/2006 | REACH (EC) No 1907/2006 compliant |

## AWG Information

| Cable Length (m) | AWG |
|---|---|
| **0.5** | 30 |
| **1** | 30 |
| **2** | 30 |
| **3** | 28/30 |
| **4** | 28 |
| **5** | 24 |
| **7** | 24 |